REPORTS - INSTITUTIONAL No 189
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THE WALTER AND ELIZA HALL INSTITUTE OF RESEARCH IN PATHOLOGY AND MEDICINE

FIFTEENTH ANNUAL REPORT

1933-34

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The Fifteenth Annual Report

OF THE

Walter and Eliza Hall Institute of Research

JULY, 1934.

The time is rapidly approaching when additional substantial financial support will be necessary unless the work of the Institute is to be seriously hampered by further retrenchment. Since 1930 we have continued the work of the Institute, without any expansion but without serious reduction in efficiency, by reducing the salaries of the staff, and by curtailing expenditure on materials and apparatus. Despite rigid economy, we have expended each year somewhat more than the income we have received, and have gradually eaten into the balance of £4,675 which we carried forward in July, 1930. In 1931 this balance was £4,545, in 1932 it was £4,373, in 1933 it was £3,827, and this year it is £2048.

Our assured annual income is approximately £4,650, made up as follows:—Walter and Eliza Hall Trust, £3,200; University of Melbourne, £750 (£500 of this is from the Melbourne Hospital Clinical Fund and the remainder interest from University Research Funds); interest from Biochemical Endowment Fund, approximately £400; interest from Library Endowment Fund, approximately £100; fees and proceeds of materials supplied, £200. In addition, we have received annually the generous support of various trusts—the trustees of the late Alfred Felton, £240; the trustees of the late Antony Mackie, £100; the trustees of the late T. J. Sumner, £20. The Biochemical Department and the Library are both continual charges upon our general funds since in neither case is the endowment adequate for their support.

To maintain our present output of work without any expansion, we need an additional assured annual income of £1,000, and, failing this, further retrenchment, which will seriously impair our efficiency, will be inevitable.

Far from contemplating such a policy of retrenchment and diminished usefulness, we are hoping to extend the work of the Institute. We are proposing to embark upon an investigation of virus diseases, particularly those affecting the nervous system. This work will be under the direction of Dr. Burnet, who has just returned to Australia after two years spent working on virus diseases at the National Institute for Medical Research, London. The work will be carried out in close co-operation with the Commonwealth Serum Laboratories, and partly in new laboratories to be erected there. It will be supported equally by the Commonwealth Government and by the Rockefeller Foundation, and £2,000 will be available annually from these sources during the next three years. It is hoped that Dr. Jean Macnamara will be available for part-time field work, and that Dr. Burnet will have the assistance of two whole-time Research Fellows.

This promise of help will not assist the general finances of the Institute to any extent, though it will provide the salaries of assistants to Dr. Burnet and materials and apparatus for his researches which are at present a charge on the general fund.

The Staff.

Dr. Kellaway returned early in January, after eleven and a half months abroad, spent in England and on the continent of Europe, and North America. Through the generosity of the Rockefeller Foundation, Dr. Kellaway was able to visit the more important research centres in the United States and Canada.

Mr. H. F. Holden returned at the end of last year, having spent nine months in England and on the Continent. Much of this time was occupied by work at Cambridge in the Biochemical Laboratories.

Dr. F. M. Burnet resumed his position as Assistant Director in February.

Dr. Ivan Connor, who was Acting Director of the Institute during Dr. Kellaway's absence, is continuing his work on fungus diseases as an Elsie Marion Carty Research Fellow.

Dr. Eric Cooper, who has also been appointed to a Marion Carty Fellowship, is at the same time acting pathologist to the Hospital during Dr. Wright-Smith's absence.

Dr. Wright-Smith, who has eight months' leave of absence, left in April to work in Dr. Turnbull's laboratory at the London Hospital.

Miss Margot McKie (Bacteriological Research Fellow) left us to be married in March.

Miss Mavis Freeman (Biochemical Research Fellow) has been granted leave of absence in order to take up the Second Travelling Fellowship of the Victorian Women Graduates' Association. She leaves us in July to work at the Lister Institute, London, with Dr. Robison.

Miss Dora Lush, after a few months spent as a voluntary worker in the routine Bacteriological Department, gained a University Research Scholarship, and since May has been working on Bacteriophage with Dr. F. M. Burnet.

Mr. E. Southwood, the Director's Secretary, unhappily had to resign on account of ill health in February. His post has not been filled, and Mr. E. Hughes, the part-time Hospital electrocardiographist, has now taken charge of part of his duties, namely, buying the necessary apparatus and materials for the Institute.

The Work of the Institute.

Australian Snake Venom.

Through the courtesy of the President, Council and Director of the Melbourne Zoological Gardens, we have continued to house our snakes and collect venom there. We have acquired this year, mainly by purchase, 163 tiger snakes, 26 copperheads, 76 black snakes, and 13 brown snakes. We have collected this year 25.847 grammes of tiger snake, 0.208 gramme of black tiger snake, 3.400 grammes of copperhead, 9.728 grammes of black snake, and 0.101 gramme of brown snake venom. We have continued to supply to the Commonwealth Serum Laboratories venom as needed for the manufacture of antivenenes.

For the collection of venom additional outside help has been needed, and we have secured Mr. Val. Lee's services one day a month to assist in "milking" the snakes.

The Venom Yields of Australian Snakes in Captivity.

Miss Freeman and Dr. Kellaway have put on record the results of several thousand milkings of 2,000 snakes carried out during the last five years. The average venom yield and the largest individual yield observed were:—For the tiger snake (*Notechis scutatus*), 0.0276 gramme and 0.189 gramme; for the black tiger snake (*Notechis scutatus var. niger*), 0.0705 gramme and 0.3886 gramme; for the death adder (*Acanthophis antarcticus*), 0.040 gramme and 0.252 gramme; for the copperhead (*Denisonia superba*), 0.0215 gramme and 0.227 gramme; for the black snake (*Pseudechis porphyriacus*), 0.030 gramme and 0.148 gramme; and for the brown snake (*Demansia textilis*), 0.002 gramme and 0.0672 gramme.

Some information is also afforded concerning the mortality of these species and the decrease of their venom yields under the conditions obtaining in captivity. These results form a useful supplement to Dr. Hamilton Fairley's and Miss Splatt's observations, which deal with about 160 snakes observed individually during the course of four to five months, and in which the size of the snakes and the distance between the fangs was correlated with the venom yields.

FREEMAN, MAVIS and KELLAWAY, C. H.:

> "The Venom Yields of Common Australian Poisonous Snakes in Captivity." "The Medical Journal of Australia" (in the press).

The bacterial flora of the mouths of Australian snakes in captivity and the contamination of dried venom.

Venom is collected from our snakes by allowing them to bite through rubber dam stretched across the mouths of small glass vessels. Though this prevents gross contamination with saliva, it does not exclude contamination of the venom by organisms present in the snakes' mouths. Snakes, under the conditions in which we house them, frequently exhibit "cancre," especially following slight injuries of the lower jaw in milking. When they are so affected, we do not collect their venom, and usually sacrifice them.

Miss Williams, Miss Freeman and Miss Kennedy have recently investigated the bacterial flora of the mouths of 49 snakes of the commoner species. Direct smears from the mouths of freshly-caught snakes contain few or no organisms, whereas after a month or so in captivity the smears are crowded with organisms. The types grown included coliform bacilli, proteus and other non-lactose fermenting bacilli, staphylococci and some anaerobes.

Freshly-collected venom contains but few organisms, and about 30% of the 50 samples collected were sterile. Of the corresponding dried venoms 50% were sterile, drying apparently killing off many of the non-lactose fermenters. These findings are of some importance, because it is obviously necessary to filter or otherwise sterilise venom solutions before using them in the large doses necessary for the immunisation of horses, or alternatively to devise better methods of venom collection for this purpose.

Improvement could be effected by keeping the snakes between milkings under natural conditions in an open-air snake park and by using rubber dam or rubber impregnated cloth sufficiently strong to prevent rupture by strongly-biting snakes.

No single organism was constantly found in "cancre," but one of two strains of *B. proteus*, or a small gram negative coccobacillus was very frequently present.

WILLIAMS, F. ELEANOR; FREEMAN, MAVIS, and KENNEDY, EILEEN:

"The Bacterial Flora of the Mouths of Australian Venomous Snakes in Captivity." "The Medical Journal of Australia" (in the press).

The Venoms of Some of the Rarer Snakes.

Dr. Kellaway has put on record a number of observations concerning the venom of some of the rarer Australian snakes. These include the following snakes of the genus *Denisonia*—*D. daemelii*, *D. flagellum*, *D. suta*, *D. coronoides*, and *D. maculata;* of the genus *Demansia*, *D. olivacea* and *D. psammophis*; of the genus *Hoplocephalus*, *H. stephensi* and *H. bungaroides;* of the genus *Furina*, *F. annulata* (the bandy-bandy), and of the genus *Pseudelaps*, *P. harriettae.* The first four species of *Denisonia*, *Demansia psammophis*, *P. harriettae*, and *F. annulata* were studied by biting experiments in small animals. Of these smaller snakes, none can be regarded as being dangeous to man or to large animals, but the bite of large specimens of *Denisonia coronoides* and of *Denisonia daemelii* may possibly cause symptoms of envenomation in man.

Observations were made on the venom of *D. maculata*, which is particularly interesting in view of the fact that in animals the paralysis of the phrenic motor endings, which is the cause of death, is spontaneously reversible, if the animal be kept alive by artificial ventilation. The venom is also peculiar because, following intravenous administration in sub-lethal dosage to rabbits, there is a sudden onset and sudden disappearance of symptoms. Finally, in a man bitten by one of these snakes a sudden and dramatic onset and disappearance of symptoms occurred.

The venoms of two rare species of the genus *Hoplocephalus* have also been examined. *H. stephensi* is probably not dangerous to man or to large animals, though the bite of a large specimen might cause symptoms. *H. bungaroides* must be regarded as being dangerous to man. Both these venoms contain a thrombin which is of the same order of potency as that present in the venoms of the tiger snake and brown snake, and the venom of *H. bungaroides* is about as toxic as that of the copperhead. It is fortunately neutralisable by monovalent tiger snake antivenene. The venom of *H. stephensi* is only half as potent as that of *H. bungaroides.*

KELLAWAY, C. H.:

"The venoms of some of the small and rare Australian snakes." "The Medical Journal of Australia" (in the press).

"The Venom of the Ornamented Snake, *Denisonia maculata.*" "The Australian Journal of Experimental Biology and Medical Science," 1934, 12, 47.

"The Venoms of the Broad-headed Snake, *Hoplocephalus bungaroides* and of the yellow-banded snake *Hoplocephalus stephensi.*" "The Medical Journal of Australia" (in the press).

Alleged "Antidotes" in the Treatment of Snakebite.

Through the generosity of Mr. A. M. Nicholas, who gave us some sheep for this purpose, it has been possible to test several of the so-called "antidotes" which are or have been recently on sale by snake showmen and others.

Our thanks are due to Dr. H. E. Albiston, Director of the Veterinary Institute of the University of Melbourne, where these tests have been made, for facilities placed at our disposal, and to his colleague, Mr. C. J. R. Gorrie, for help in these experiments.

A paper embodying these results and some data collected by Mr. E. Southwood concerning mortality among snake showmen is in course of preparation.

The Peripheral Action of Australian Venoms.

Dr. Kellaway is continuing his studies on the peripheral action of Australian venoms and work on the action of these venoms on tactile endings in skin and on muscle spindles is in progress.

During his absence in Europe Dr. Kellaway read a paper before the Royal Society of Tropical Medicine and Hygiene entitled "Some Peculiarities of Australian Snake Venoms." In this he contrasted the action of the colubrid and viperine snake venoms, and pointed out that, though Australian colubrid snakes presented a gradual transition in morphological characters towards the viperine type, there is no regular transition in their venoms. He summarised briefly the points of difference between the Australian colubrid venoms and those of other colubridae, and discussed the recent work at this Institute upon snake venom haemolysis and upon the action of the venoms on the peripheral nerves and on smooth muscle.

Kellaway, C. H.:

> "Some Peculiarities of Australian Snake Venoms." "Transactions of the Royal Society of Tropical Medicine and Hygiene, 1933, 27, 9."

The Venom of Atrax robustus.

Ingram and Musgrave have recently reviewed fatalities following the bite of this large funnel web spider, and Dr. Kellaway has now put on record a number of biting experiments made in 1930 with some specimens sent him by Mr. Musgrave.

These experiments were uniformly negative, a result which is possibly to be attributed to the insusceptibility of the rabbit, guinea-pig and mouse to the venom.

Kellaway, C. H.:

> "A Note on the Venom of the Sydney Funnel Web Spider, *Atrax robustus.*" "The Medical Journal of Australia," 26th May, 1934, page 679.

Biochemical Department.

Snake Venom Haemolysis.

Mr. Holden has completed the third paper of our series on haemolysis by snake venoms. This study of copperhead haemolysis was commenced during three months spent in the Sir William Dunn Institute of Biochemistry at Cambridge, and has been completed since his return. Mr. Holden, by the study of time-dilution curves, has shown that the hydrogen ion concentration affects the velocity of haemolysis of rabbit cells by copperhead venom. It is therefore extremely important to use buffered solutions in such investigations. He has studied the inhibitory effect of proteins and has produced further evidence against the view that they inhibit by forming compounds with venom. Unlike saponin haemolysis, venom haemolysis is accelerated by haemoglobin.

Holden, H. F.:

> "Haemolysis by Australian Snake Venoms. 3. Some Factors which Influence the Action of the Venom of the Copperhead." "The Australian Journal of Experimental Biology and Medical Science," 1934, 12, 55.

During Mr. Holden's absence, his personal assistant carried out a number of fractionations of human thyreoglobulin by the methods developed for the globulins of mammalian sera. He determined the proportion of iodine in the proteins of the different fractions, using a method for which we are indebted to Mr. Ampt, of the University Department of Chemistry.

Proteins having a high iodine content were found in both the pseudo-globulin and the euglobulin fractions. It has not yet been possible to decide whether this indicates two different iodine-containing proteins or whether, as suggested in a paper from this Institute, the method of repeated dialysis fails to effect much separation.

Miss Freeman has continued her work on edestin and on the mutual solubility of two dissimilar proteins. She prepared a substituted quinhydrone in an unsuccessful attempt to find one that would be stable in slightly more alkaline solutions than ordinary quinhydrone for pH determinations. Miss Freeman is at present completing her work for publication before she leaves for England.

Mr. Holden is carrying on his work on haemolysis, and is constructing an apparatus for the measurement of velocity curves instead of the more usual time-dilution curves.

Bacteriophage.

The study of Miss McKie and Dr. Burnet of the classification of bacteriophages acting on *B. coli* was nearly completed at the end of 1931, before Dr. Burnet's departure for England. Publication was delayed, however, to allow of the incorporation of certain results obtained in a serological classification of the same phages which was carried out at the National Institute for Medical Research. The whole question of phage classification has been discussed in a series of three papers, the first of which covers work done at the Hall Institute, and deals principally with the results of cross resistance tests on the lines laid down by Bail. The results were extremely complicated, and indicated the presence of two major groups, comprising the great majority of active bacteriophages lysing organisms of the coli-dysentery group and two more specialised groups. This work was an essential preliminary to subsequent work, mainly along serological lines which allowed a more satisfactory scheme of classification to be developed.

F. M. Burnet and Margot McKie:

"The Classification of Dysentery-coli Bacteriophages. i. The Differentiation by Bail's Methods of Phages Lysing a Typical *B. coli* Strain." "Journal of Pathology and Bacteriology," 1933, 36, 299.

Present-day opinion is tending to emphasise the virus-like nature of the bacteriophages, but there are still difficulties in explaining the lysogenic (i.e., phage producing) power of certain bacteria. Miss McKie has studied a considerable series of coliform strains, mostly from urinary infections, in an attempt to elucidate the nature of the bacteriophages produced by lysogenic bacteria. About 31% of the 119 strains examined produce bacteriophage, some strains producing more than one type. Some of these phages appear to be too "weak" to survive passage, but a majority of them could be grown at the expense of a sensitive indicator strain of bacteria and their characters studied.

It has been found that the majority of the phages obtained fall into three fairly distinct groups, differentiated from each other and from the other groups defined previously by Burnet and McKie, by serological and cross resistance tests. The lysogenic character seems to be very irregularly and fortuitously distributed amongst the various biochemical types of coliform organisms. In general the results resemble those obtained by Burnet with Salmonella strains, and are more readily interpreted in terms of d'Herelle's hypothesis of symbiosis or semi-parasitism between phages and bacteria than on any alternative view.

MARGOT MCKIE:

"The Lysogenicity of Coliform Bacteria" (in the press).

Dr. Burnet has continued work on the interaction between bacteriophages and the specific polysaccharides present in filtered bacterial extracts. It was established in work with Dr. G. A. C. Gough at Hampstead that bacteriophages may be inactivated by extracts of those bacteria which they can lyse, and that the inactivation is a function of the specific polysaccharides which are responsible for most of the antigenic behaviour of the bacteria. This work has provided an independent means of studying the nature of the bacterial antigens, in addition to classical serological methods, and has opened up several problems which are being studied.

Miss D. Lush has commenced work on staphylococcal bacteriophages, with a view to determining whether similar methods can be applied to the study of staphylococcal antigens.

Work on Filterable Viruses.

Work at the National Institute for Medical Research indicated that the developing hen's egg offered a valuable medium for the study of certain viruses, particularly of those causing diseases of birds, but in addition of a number capable of infecting man or other mammals. As the possibilities of this method have been little explored, further investigations are being carried out here by Dr. Burnet. Arrangements for the supply and incubation of eggs have been made, and for the present the work is concerned mainly with defining the limitations and possibilities of the technique, especially in regard to the accuracy of titration of such viruses as are suited to the method. As opportunity offers material from cases of disease of possible or probable virus origin is being tested on the developing egg in case this should prove a suitable medium for the hypothetical viruses concerned.

The apparatus required for the production of Elford's membrane filters has been procured, and, by arrangement with Dr. F. G. Morgan, Director of the Division of Laboratories of the Commonwealth Government, their preparation is being undertaken by Mr. J. J. Graydon at the Commonwealth Serum Laboratories. In the meantime a supply of membranes kindly provided by Dr. Elford has been used for obtaining sterile material for egg inoculation.

Dr. Burnet has published a short paper developing the hypothesis that the Australian X disease epidemics of 1917-18 were manifestations of louping ill virus infection. This has been done in the hope of obtaining material bearing on this question.

F. M. BURNET:

> "Louping Ill Virus as a Possible Cause of the X Disease Epidemics of 1917 and 1918." "Medical Journal of Australia," 26th May, 1934, page 679.

Infantile Paralysis.

Dr. Southby and Miss McKie have made some observations by *in vitro* neutralisation experiments on the protective power of pooled normal adult serum against poliomyelitic virus. Unfortunately, the number of monkeys available was not sufficient for complete titration of protective power, but the results, in agreement with those of workers in other countries, indicate that the pooled normal serum has about a third the protective power of convalescent serum.

SOUTHBY, ROBERT, and MCKIE, MARGOT:

"Some Experimental Work on Poliomyelitis." "The Medical Journal of Australia," 23rd September, 1933, page 404.

Immunity and Staphylococcal Infections.

Dr. Connor and Miss Margot McKie have continued their studies in this field, and their results show that, though there is much individual variation, superficial infection in man is frequently accompanied by a rise in the antihaemolytic titre of the serum. The treatment of a series of seventeen cases of *Sychosis barbae* and *Sychosis nuchae,* and of nineteen other cases of carbuncle, pustules, and boils, due to staphylococcal infection showed in general good response to treatment with repeated injections of toxoid and exhibited a rise in antihaemolytic titre accompanying improvement or cure of the condition. The authors were not inclined, however, to assume that these parallel findings are necessarily co-related. Of eleven rabbits immunised against staphylococci, three survived indefinitely the intravenous injection of 0.5 cubic centimetre of a virulent broth culture.

CONNOR, J. I., and MCKIE, MARGOT:

> "Treatment of Superficial Staphylococcal Infection by Toxoid." "British Journal of Dermatology and Syphilis," 1934, 46, 20.
>
> "A Study of the Antihaemolytic Titre of Sera of Man and Animals Following Staphylococcal Infection." "Journal of Pathology and Bacteriology," 1933, 37, 353.

Pathogenic Yeast-like Fungi.

Dr. Connor and Miss McKie have continued their work on pathogenic fungi. In investigating the pathology of paronychia and intertrigo, they have isolated several strains of yeast-like organisms which differ from *Monilia albicans* in pathogenicity for rabbits and in fermentative reactions. They have attempted to classify these by agglutination with adsorbed sera and by precipitin tests.

CONNOR, J. I., and MCKIE, MARGOT:

> "Pathogenicity of Yeast-like Fungi." "The Medical Journal of Australia" (in the press).

The Sterilisation of Catgut.

Miss Williams has investigated the remainder of the catgut under suspicion in connection with three cases of post-operative tetanus which occurred in Melbourne last year. This involved the examination of 52 reels of catgut, all prepared by the biniodide method. Of these, four were found to be infected with *Cl. sporogenes* mixed with organisms morphologically indistinguishable from *Cl. tetani.* Miss Williams was not successful in isolating *Cl. tetani* in pure culture, but experimental tetanus was produced in animals injected with the cultures from one reel. A brief note of these investigations has been recorded to draw attention once more to the importance of not relying upon alcoholic solution of biniodide for sterilisation, and advising sterilisation by impregnation with iodine.

KELLAWAY, C. H., and WILLIAMS, F. ELEANOR:

"The Sterilisation of Catgut." "The Australian and New Zealand Journal of Surgery" (in the press).

Lead Poisoning and Nephritis in Queensland.

At the request of the Queensland Government, Dr. Keith D. Fairley has reviewed the evidence accumulated by Dr. L. J. Nye and others relating to lead as an aetiological agent in chronic nephritis in Queensland. It appears that chronic nephritis in people under 40 years of age is three times as common as in the other Australian States; that a very large proportion of young children who suffer from lead poisoning with paralysis die from chronic nephritis before middle age, and that the increased mortality before this age period in Queensland is *in part* due to lead poisoning in childhood.

The weathering of lead paint on the outside of houses and verandah railings in Queensland exposes young children to a definite lead hazard. Some lead poisoning may arise from the ingestion of fruit and vegetables sprayed with lead arsenate.

The available evidence does not indicate that hereditary influences, scarlet fever, congenital syphilis or other infections play any important part in causing the increased mortality from chronic nephritis in Queensland except in so far as hereditary influences may affect individual susceptibility to lead poisoning.

The most important further investigation needed is the study of the pathological changes in the kidneys of persons dying before middle age of chronic nephritis, and the correlation of these changes with evidence of storage of lead in the body by the examination of the bones and teeth. The blood changes in children subjected to lead risk should be studied, and evidence of the deposition of lead should be sought by radiological examination of the ends of the long bones and by chemical examination of extracted teeth. Finally, the excretion of lead in these children should be followed up chemically.

Legislation against the use of lead paint should be directed against its use on any articles available to children, for instance, furniture, toys, pencils, as well as on external surfaces of houses and verandahs. Stringent regulations should also govern the spraying of fruit and vegetables with lead arsenate.

FAIRLEY, K. D.:

"A Review of the Evidence Relating to Lead as an Aetiological Agent in Chronic Nephritis in Queensland." "The Medical Journal of Australia," 5th May, 1934, p. 600.

Morbid Anatomy.

During the year 479 autopsies were performed. Dr. C. H. Mollison, Dr. Wright-Smith, and, since the departure of the latter, Dr. Eric L. Cooper have been responsible for the examinations of biopsy material. These examinations have numbered 977. The microscopic and macroscopic photography has been done by Miss Wischusen.

Museum.

We have greatly improved the lighting of the Museum, and a number of new specimens have been added. We are indebted for gifts of specimens to Dr. R. W. Chambers, Mr. Alan Hailes, Mr. Victor Hurley, Mr. Basil Kilvington, Mr. E. S. King, Mr. Alan Newton, Dr. C. H. Mollison, Mr. J. T. Tait, and Mr. B. T. Zwar.

Bacteriology and Clinical Pathology.

The diagnostic work in bacteriology, serology and haematology has been carried out by Dr. Bryce and Dr. Gardner. Dr. Bryce and Dr. Paul Jones have typed donors for the Red Cross Voluntary Blood Transfusion Service. This department has also been responsible for the diagnostic skin tests and some therapeutic immunisation in allergic cases.

A number of special serological examinations, for example, hydatid and bilharzial complement fixation tests, have been done by Miss F. E. Williams.

Biochemistry and Basal Metabolism.

There is a continually increasing demand for biochemical work both for in-patients and out-patients, and Miss Splatt and her assistants have been kept very busy throughout the year. The major part of the work comprises glucose tolerance and renal efficiency tests, and analyses of blood and cerebro-spinal fluid. The basal metabolism determinations average between two and three daily, and we still continue to use the Haldane method.

Electrocardiography.

Mr. E. Hughes is in charge of this department, three days a week being necessary to carry out this work, which involves taking between 500 and 600 records a year.

Teaching.

During the year practical experience in Clinical Pathology has been gained by sixth-year students, under Dr. Bryce and Dr. Gardner.

Dr. Lucy Bryce and Dr. Wright-Smith gave lectures in the post-graduate course for nurses in February of this year.

Dr. Cooper is paying special attention to the teaching of morbid anatomy. A collection of specimens which can be handled is being collected in special galvanised iron tanks and some changes have been made in the organisation of the Museum to make it even more useful for teaching purposes.

The Library.

Our thanks for the gift of journals and books are due to the following:—L'Académie Royale de Medicine de Belgique; The Cancer Research Committee, Sydney; The Commonwealth Department of Health; The Council of Scientific and Industrial Research; Miss Danks; The London Hospital; The Medical Research Council; The Middlesex Hospital Medical School; New York State Department of Health, Division of Laboratories and Research; Otago University Medical School; The Rockefeller Institute; The Royal Prince Alfred Hospital, Sydney; The Royal Society of New South Wales; La Société Royal des Sciences Médicales; The South African Institute for Medical Research; The University of Harvard, Department of Tropical Medicine; The University of Pennsylvania, Department of Pathology.

Walter and Eliza Hall Institute of Research in Pathology and Medicine

FINANCIAL STATEMENT FOR THE YEAR ENDED 30th JUNE, 1934.

RECEIPTS.

	£	s.	d.	£	s.	d.
To Balance brought forward from 30th June, 1933				£3,827	12	7
,, Trustees Walter & Eliza Hall Trust	£3,200	0	0			
,, Felton Bequest Committee	240	0	0			
,, Estate late Edward Naylor	240	17	5			
,, Trustees late Anthony Mackie	100	0	0			
,, Trustees late T. J. Sumner	10	0	0			
,, Dr. A. M. Wilson	50	0	0			
,, Melbourne Hospital	171	8	0			
,, Society of Chemical Industries, Basle	30	0	0			
,, Fees Received and Proceeds of Materials Supplied	153	0	6			
,, Interest	78	1	8			
,, E. M. Carty Fund—Assistance and Materials	100	0	0			
				4,373	7	7
				£8,201	0	2

EXPENDITURE.

	£	s.	d.	£	s.	d.
By Salaries and Wages	£4,043	1	2			
,, Materials	614	13	1			
,, Apparatus	379	10	4			
,, Buildings	24	9	9			
,, Sundries	141	0	1			
,, Travelling Expenses, Fares—London	264	1	9			
,, Repairs to Apparatus	26	3	3			
,, Repairs to Buildings	65	19	1			
,, Publications	38	11	4			
,, Fittings and Equipment	58	16	0			
				£5,656	5	10
,, Biochemical Department	399	10	8			
,, Library Account	97	3	1			
				6152	19	7
,, Balance—						
Investments	1,875	0	0			
Cash with Agent-General, London	75	0	0			
Secretary's Advance A/c	100	0	0			
	2,050	0	0			
,, Less Bank of New South Wales	1	19	5			
				2,048	0	7
				£8,201	0	2

THE ELSIE MARION CARTY FUND.

	£	s.	d.		£	s.	d.
To Balance brought forward from 30th June, 1933	£345	1	2	By Salaries	£100	0	0
,, Trustees late E. M. Carty	165	6	4	,, Materials and Assistance	100	0	0
				,, Balance—Bank of New South Wales	310	7	6
	£510	7	6		£510	7	6

BIOCHEMICAL ENDOWMENT ACCOUNT.

	£	s.	d.		£	s.	d.
To Balance brought forward from 30th June, 1933	£8,591	10	3	By Bank Charges	£1	12	6
,, Interest on Investments	446	14	4	,, Transferred to Biochemical Department A/c	445	1	10
				,, Balance— Investments .. .. .. £8,589 12 6 Bank of New South Wales 1 17 9	8,591	10	3
	£9,038	4	7		£9,038	4	7

BIOCHEMICAL DEPARTMENT ACCOUNT.

	£	s.	d.		£	s.	d.
To Interest—Endowment A/c	£445	1	10	By Salaries and Wages	£838	15	4
,, Transfer from Income A/c	399	10	8	,, Materials, etc.	5	17	2
	£844	12	6		£844	12	6

LIBRARY ACCOUNT.

	£	s.	d.		£	s.	d.
To Balance brought forward from 30th June, 1933	£2,069	3	0	By Books, Journals and Bookbinding	£232	14	1
,, Interest on Investments	96	8	0	,, Balance—Investments	2,030	0	0
,, Transfer from Income Account	97	3	1				
	£2,262	14	1		£2,262	14	1

AUDITOR'S CERTIFICATE.

I have to report that I have completed the Audit of the books and accounts of the Institute for the period ended 30th June, 1934. I have verified all receipts, and have had vouchers produced for all disbursements. All information and explanations required have been given. The Statement is a correct statement of Receipts and Expenditure as revealed by the books of the Institute.

(Sgd.) W. M. JARVIE, F.C.A. (Aust.),
Auditor.